3Com® Switch 8800 Power Over Ethernet

Installation Guide

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1 INTRODUCTION

Switch 8800 PoE Power Rack

The 3Com Switch 8800 PoE power rack is a modular, stand-alone Power over Ethernet (PoE) power source. The PoE Power Rack provides a total of 4500 Watts of DC power with 2+1 power redundancy for PoE powered devices connected to the Switch 8800 chassis.

Features

The PoE Power Rack has the following features:

- Compatible with a wide range of input voltages from 90 V to 264 V and uses 20 A/250 VAC EN60320 C20 appliance coupler connectors and connector plugs.
- Power factor is above 0.99
- Efficiency is over 88%
- Maximum device output is (N + 1) 90A @ 54V
- Power supply modules are hot-swappable for uninterrupted operation
- The PoE Power Rack power status may be monitored by an RS232 or RS485 interface
- Advanced EMC (Electro Magnetic Compatibility) design
- High safety and reliability

Architecture and Configurations

The PoE Power Rack architecture integrates DC power supply modules (3 maximum), a system controller, and the distribution module, in a four rack-unit-high (4U) chassis. The system controller provides local monitoring and control of the device. The general configuration is shown in Table 1.

Table 1 The PoE Power Rack Configuration

Description	Standard Configuration
4U high chassis	D x W x H- 320.5 x 482.6 x 177mm (12.62 x 19.00 x 6.97 in)
System controller	One
SWITCH 8800 PoE Power Supply Module	One installed (3 maximum for power redundancy)
AC distribution components	■ Three independent AC power input sockets with three AC Power switches ■ 3-phase AC voltage sensor

The standard PoE Power Rack is configured with one power supply module. The power rack may be configured with up to 3 power supplies based on the power and power redundancy requirements. Refer to Figure 1 for overall dimensions. Refer to Figure 2 for the rear view of the PoE power rack.

Figure 1 The PoE Power Rack

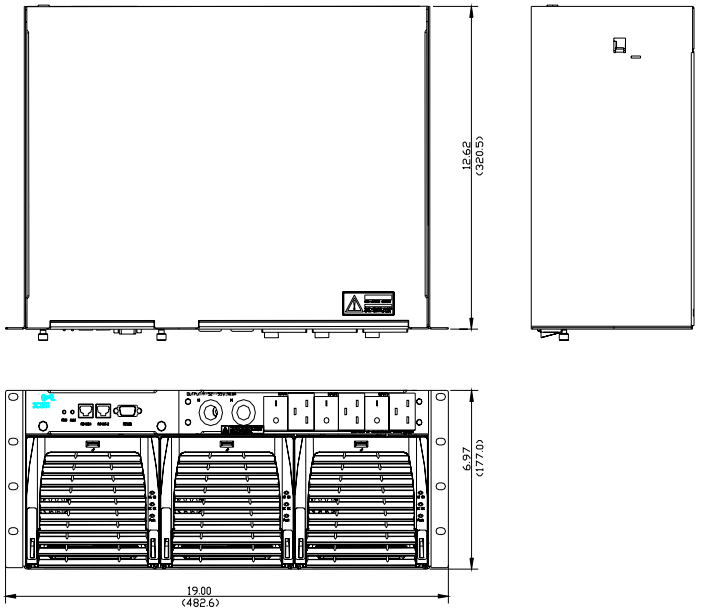
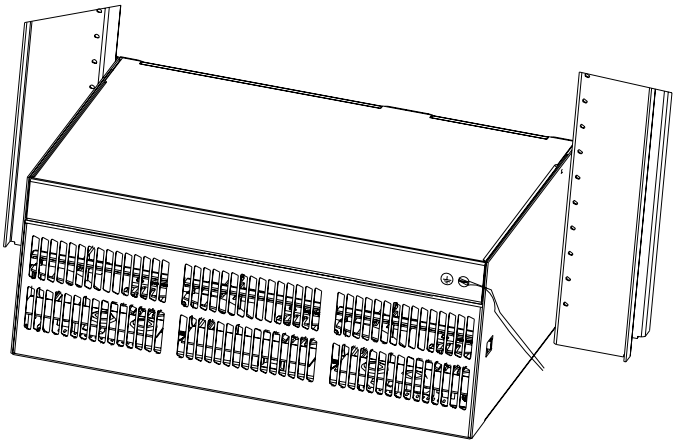


Figure 2 The PoE Power Rack (Rear View)

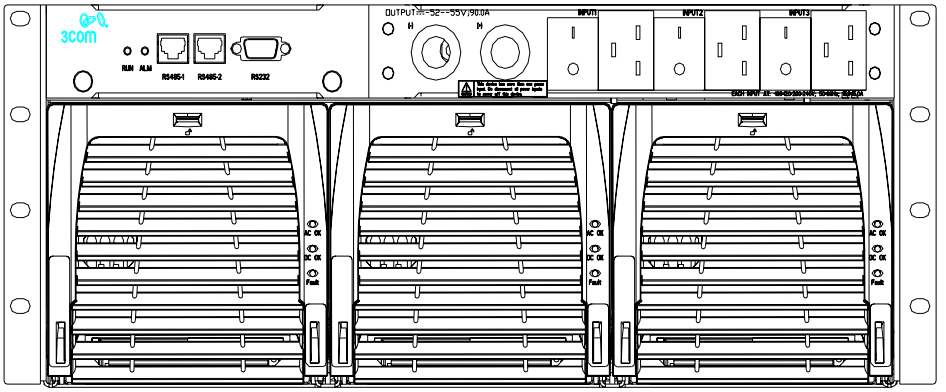


Refer to Figure 3 for the front view of a fully equipped PoE power rack. It consists of:

- System controller with 2 LEDs and 3 connectors
- Distribution panel with DC output sockets and three AC input sockets
- Power supply modules (3 modules are shown in Figure 3)

The three AC input sockets correspond to the three power supply modules (numbered from left to right).

Figure 3 The PoE Power Rack Configured with Three Power Supply Modules (Front VIew)

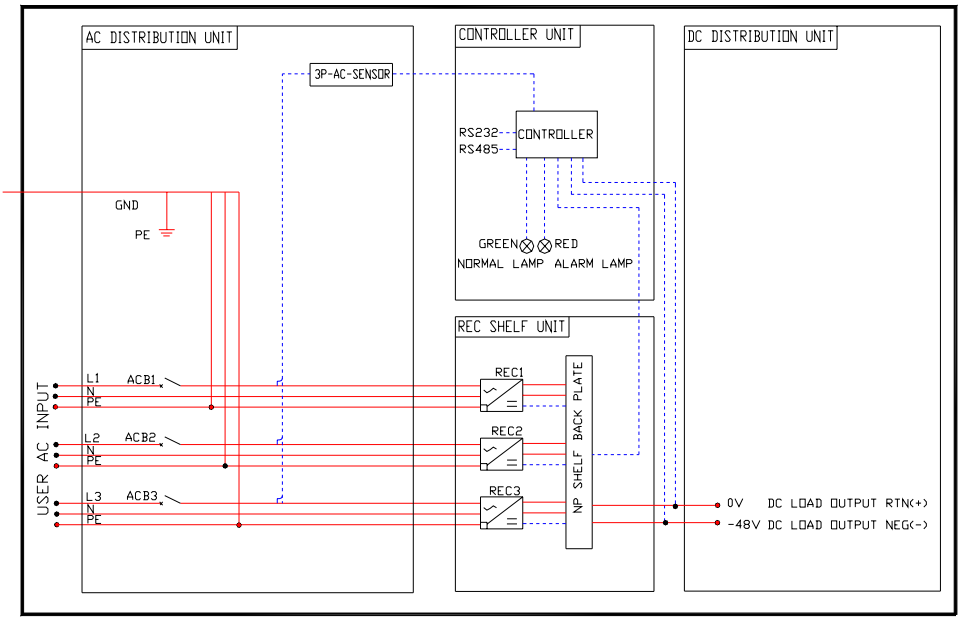


2 System Description

Overview

Figure 4 shows the schematic diagram of the PoE Power Rack power system, showing the interconnections and signal flow through the power supply modules and internal components.

Figure 4 Schematic Diagram of the PoE Power Rack



Power Supply Modules

DC power is supplied to the power bus by the power supply modules.

The PoE Power Supply Module is interchangeable between the Switch Rack and the Switch 8800 PoE Power Rack. NO other components are interchangeable.

PoE Power Rack

Up to three power supply modules can be mounted in each PoE Power Rack. Each power supply module in the PoE Power Rack receives AC power from the AC distribution panel.

Power Supply Module Visual indicators

The front panel of the power supply module has three LEDs (Figure 5). Their descriptions, colors, and functions are shown in Table 2.

Figure 5 Power Supply Module Front Panel

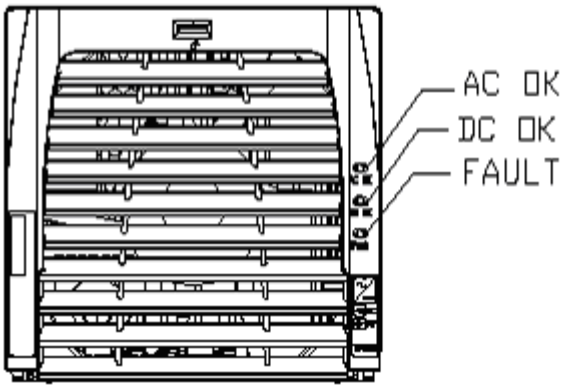


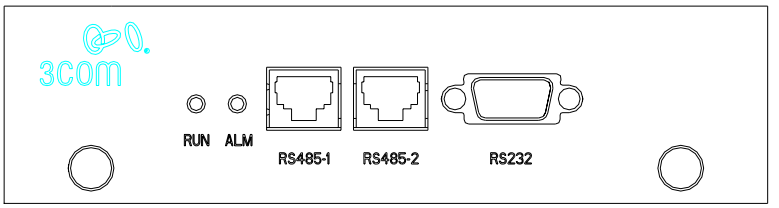
Table 2 LED State Description

Condition	AC OK (green)	DC OK (green)	Fault (Red)
All OK	Lighted	Lighted	Off
Thermal alarm (Ambient)	Lighted	Off	Off
Thermal alarm (fan fail)	Lighted	Off	Lighted
Blown AC fuse in unit	Lighted	Off	Lighted
Low or no AC > 15mS (single unit)	Off	Off	Off
AC not present in any power supply module	Off	Off	Off
Over Voltage Latched shutdown	Lighted	Off	Lighted
Any internal failure	Lighted	Off	Lighted

System Controller

The PoE Power Rack has a system controller at the front of the chassis. Refer to Figure 6.

Figure 6 Front Panel of the Controller



To indicate operational and alarm status, a green LED (RUN) and red LED (ALM) are located on the front panel of the PoE system controller. When the system has an alarm, such as input failure, input over-voltage or under-voltage, output over-voltage or under-voltage, power supply failure, or power supply self-protection, the red (ALM) LED will light. Once the alarm status is cleared, the LED goes off.

The system controller of the PoE Power Rack has two major functions:

- Monitor system operation status - An AC sensor card inside the PoE Power Rack samples the AC input voltage. The sampled signal is sent to the controller for processing. If the AC input voltage is lower than the pre-set alarm level, the controller reports an AC input under-voltage alarm. Likewise, if the input voltage is higher than the pre-set alarm level, the controller reports an AC input over-voltage alarm. The DC output voltage is also sampled and sent to the controller. If the output voltage is lower than the pre-set alarm level, the controller will report a DC Low alarm. Likewise, if the DC output voltage is higher than the pre-set alarm, the controller reports a DC output High alarm. The power supply module status communicates with the controller via an internal RS485 bus. If the power supply modules issues an alarm, the alarm is passed to the controller. Power supply module failure alarms include: AC input failure, DC output failure, fan failure, high output voltage, current limit, over temperature, and module shut-down.
- Communicate with deamon systems - The controller supports interface to the Switch 8800 chassis through RS232 or RS485 cable connection. A cable is provided with the PoE Power Rack for attachment to the Switch 8800 (connect the RS232 connector end to the PoE Power Rack and connect the RJ45 cable end to the port labeled "Com" next to the PoE DC terminal block on the back of the Switch 8800). Using CLI commands, the user can receive and read system information or command the operation of the PoE Power Rack. The RS485-1 and RS485-2 have the same function. The customer can choose only one port for communication. The RS485/RS232 can not work at same time, so do not connect them both at the same time.

There is one RS485 port and one RS232 interface on the rear panel of the PoE Power Rack (the cable provided with the PoE Power Rack is a RS232 cable type).

The RS485 and RS232 signals are described in Table 3 and Table 4. :

Table 3 RS485 Pin Definitions

Pin	Definition
1	Transmit, +
2	Transmit, -
3	Receive, +
4	Ground
5	Not used
6	Receive, -
7	Ground
8	Not used

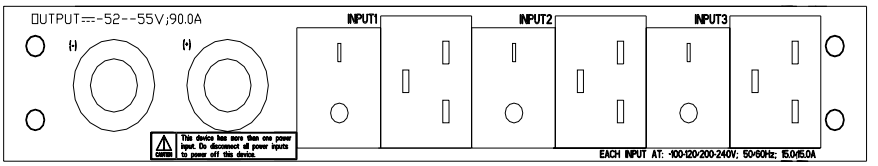
Table 4 RS232 Pin Definitions

Pin	Definition
1	Not used
2	Receive
3	Transmit
4	Not used
5	Ground
6 - 9	Not used

Distribution Panel

The distribution panel consists of DC output sockets and three AC input sockets. Refer to Figure 7.

Figure 7 Distribution Panel



The three EN60320 C20 AC input sockets on the front panel of the device are rated at 20A@250VAC. Each socket supplies power to one power supply module. There is an AC power ON/OFF switch beside each AC input socket for individual power switching.

The DC distribution panel has Copper bus bars and two 4 AWG/570mm cables with OT25-8 terminals to provide 54VDC output of the device. Use the two cables to connect the power rack and the Switch 8800 chassis. The output socket on the left is marked "-" (negative). The output socket on the right is marked "+" (positive).

3 SAFETY

Safety Statements

Please read and follow all safety instructions and warnings before servicing the PoE Power Rack. Refer to the individual module product manuals for additional safety statements specific to the modules.

- The device must be in a restricted access area (dedicated equipment rooms, equipment closets, etc.) where the applicable requirements of the device are met.
- The equipment must be in a controlled environment (an area where the humidity is maintained at levels that cannot cause condensation on the equipment, the contaminating dust and irritant gases controlled, and the steady-state ambient temperature is within the range specified).
- Do not install this equipment at a combustible place.
- This equipment has been evaluated for use in a continuous ambient temperature of up to 50°C.
- Torque electrical connections, conforming to the values specified on labels or in the product documentation.
- Refer to the product documentation for the proper hardware. Use only the parts specified in the equipment documentation.
- Improper fuses/circuit breakers may cause body injury or equipment damages.
- External circuit breakers must be sized as required by the applicable local codes. Refer to the equipment ratings to assure the equipment rating will not exceed 80% of the value of the breaker chosen.

Warning Statements and Safety Symbols

The symbols may sometimes be accompanied by some types of statement, for example, "Hazardous voltage/energy inside" or "Risk of injury". "This device must be accessed only by qualified personnel."

	This symbol identifies the need to refer to the equipment instructions for important information.
	This symbol is used to identify the protective safety earth ground for the equipment.

These symbols are used to identify the presence of hazardous AC/DC main voltage and also can be used to alarm the level of danger.

Precautions

When working on this type of equipment, the following precautions must be noted:

- This unit must be installed, serviced, and operated only by skilled and qualified personnel who have the necessary knowledge and practical experience with

electrical equipment and who understand the hazards that can arise when working on this equipment.

- The PoE Power Rack can be powered by multiple AC inputs, ensure that the appropriate circuit protection device for each AC input being serviced is disconnected before changing or servicing a Power Supply Module. If servicing the PoE Power Rack, all the AC power cords must be removed from the equipment.
- High leakage currents may be possible on this type of equipment. Make sure the equipment is properly grounded before connecting AC input power. Use only properly grounded AC power cords.
- Hazardous energy and voltages are present in the device and on the DC output cables that can shock or cause serious injury. Follow all safety warnings and practices when servicing this equipment. Insure that the PoE Power Rack AC power cords are unplugged from the PoE Power Rack before connecting the DC output cables to the PoE Power Rack and the Switch 8800.
- Exercise care when servicing this area.

In addition to proper job training and safety procedures, the following are some basic precautions that should always be used:

- Use only properly insulated tools.
- Remove all metallic objects (key chains, glasses, rings, watches, or jewelry).
- Wear safety glasses.
- Test circuits before touching.
- Lock out and tag any circuit breakers/fuses when possible to prevent accidental turn on.
- Be aware of potential hazards before servicing equipment.
- Identify exposed hazardous electrical potentials on connectors or, wirings. (Note the condition of these circuits, especially any wiring).
- Be careful when removing or replacing any covers - avoid contacting any circuits.

4 INSTALLATION AND TESTING

Introduction

This section outlines the sequence for installing the PoE Power Rack, including plug-in modules. Test procedures for verifying the integrity of the installation are also included.

Guidelines

The device must be installed to allow sufficient front and rear access. All cables must be routed through insulated conduit openings. All service operations can be completed on the front of the power rack.

EMI Considerations

When running the DC output cables, ensure that the positive and negative cables are routed so as no loops are created.

Safety

WARNING:

- Only qualified personnel can install and service the PoE Power Rack.
- Hazardous energy is present in the device and on the interface cables, which can cause electric shock, serious injury, or death if safety precautions are ignored. Follow all safety warnings and practices when servicing this equipment.

Installation Sequence

Review all safety warnings in Section 3 before beginning the installation process. Observe all warnings and labels on the equipment.

The PoE Power Rack consists of a chassis which includes AC and DC distribution modules, one system controller, one power supply module and one power supply module bracket. Refer to Figure 2 and Figure 3 for relationship of components.

Note that the PoE Power Rack is shipped mostly pre-assembled so as to minimize the overall installation process. The following installation sequence is recommended:

1. Mount chassis
2. Install power supply modules
3. Ground frame
4. Connect to Switch 8800 Chassis
5. Connect to loads
6. Connect to AC utility/AC grounding
7. Initialize the system

Install the PoE DIMM Module

If you are installing the optional PoE DIMM module, use the following instructions.

Technical Specifications

The technical specifications of PoE DIMM (Dual In-line Memory Module) are listed in Table 5.

Table 5 Technical specifications of PoE DIMM module

Model	Number of ports	Type	Disconnect	Detection
PD67024MUAC	24	Master	AC	Powered devices compliant with IEEE 802.3af or the legacy standard
PD67024S	24	Slave	AC/DC	According to Master

Install the PoE DIMM Module

Wear an ESD-protective wrist strap when installing the PoE DIMM modules.

Insert the Master and Slave DIMM modules in the right sockets. The silk screens on the interface card must be consistent with those on the PoE DIMM modules. If the modules are wrongly seated, cooling problems may occur, though the PoE module can operate normally.

Note:

- With the reverse insertion prevention design, you can only insert the module in the right direction.
- The PoE DIMM module is only supported on the PoE I/O module.
- If no PoE SIMM module is in place, or the module is not fully seated, the interface card cannot supply power, even if other functions go well.

The Master and Slave DIMM modules must be used at the same time.

Follow these steps to install the PoE DIMM:

1. Check the position of the module.
2. Insert the Master DIMM module into the J15 socket of the interface card and the Slave DIMM module into the J16 socket.
3. Close the locking spring clips until the pins at both ends of the clip snap into the notches in the module.

Mount Chassis

All items required for installation are contained within the packaging. Additional power supply modules are shipped separately. Check the packing list. Rack or frame mounting screws are not included.

1. Place unit box in a vertical position near the installation site (equipment cabinet or rack).
2. Carefully remove the crate top, crate sides, and the packing material. If possible, recycle the packing crate and the packing material. If not, dispose of properly according to local codes and regulations.

3 The following items are included in the unit packaging: PoE Power Rack, power supply module, dummy faceplates and cables. Remove all this material and place aside.

Mounting screws are NOT supplied with the PoE Power Rack. Mounting screws may be obtained from the equipment rack/cabinet supplier.

4 It is your option to remove power supply module and dummy faceplates or before installation. Removing them makes the next step easier. Refer to Figure 8.

5 Install the chassis into the 19-inch equipment rack or cabinet, using at least four screws. *See Figure 9.*

At least four screws must be used to ensure the PoE Power Rack is securely mounted in the equipment rack or cabinet. Failure to use four screws may cause damage to the PoE Power Rack.

When using an electric screwdriver, the correct torque setting recommended is 6.2 to 6.5 Newton meters. Do not over tighten the mounting screws.

Figure 8 Removing Power Supply Module and Dummy Faceplate

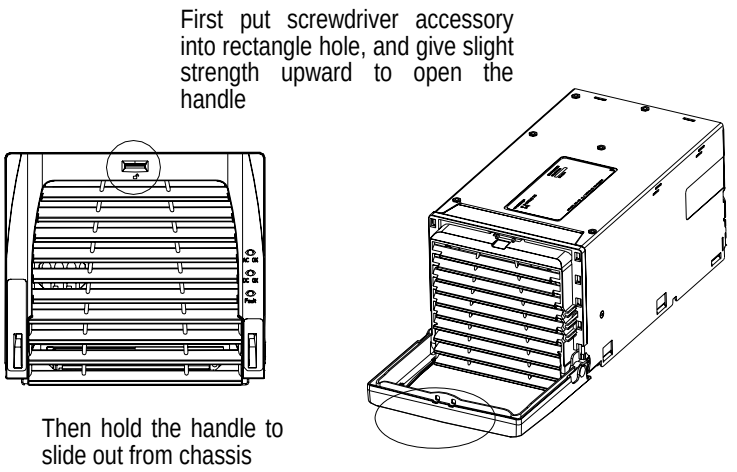
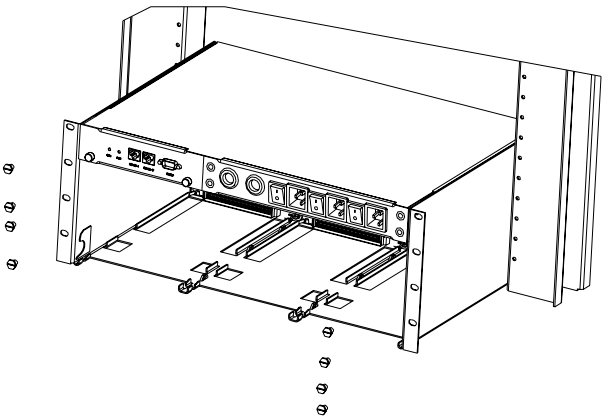


Figure 9 Physical installation

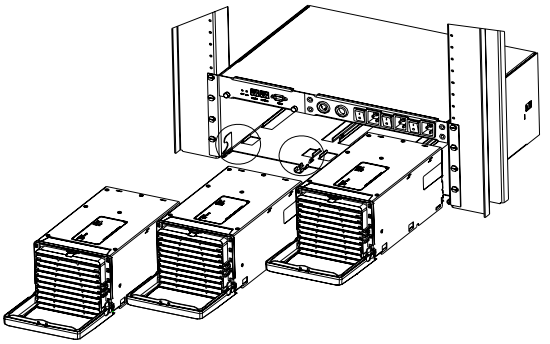


Install Power Supply Modules

Power Supply Modules are installed by sliding into the power rack, pushing until the power supply module is fully inserted, and closing the handle on the power supply module. Refer to Figure 10.

1. Verify that the AC power switches on the AC distribution panel are in the "OFF" position .
2. Insert the power supply module into the PoE Power Rack and slide it toward the backplane until it contacts the backplane connectors.
3. Close the handle on the front of the power supply module and verify that the module is firmly seated.

Figure 10 Install Power Supply Modules

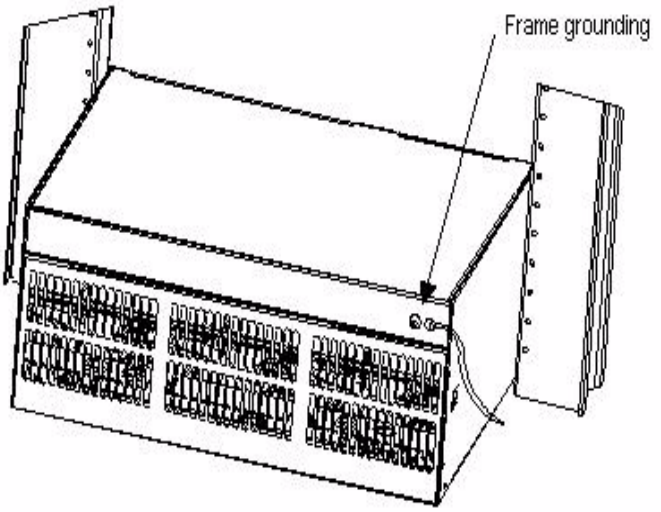


Ground PoE Power Rack

The PoE Power Rack must be electrically grounded before making any further electrical connections. (Refer to the installation instructions for grounding the PoE Power Rack).

1. It is recommended that the supplied green/yellow 16 mm 2 cable with a M6 single hole terminal lug is securely connected to the PE grounding terminal on the rear panel of the chassis, as shown in Figure 11.
2. Terminate the other end of the conductor to a grounding plate or other acceptable ground point. Follow local rules and codes regarding grounding requirements.

Figure 11 Frame Grounding



Connecting to AC utility/ AC grounding

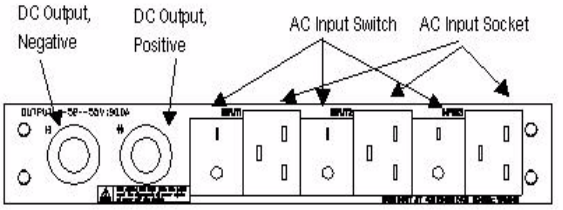
AC power input is accessed from the front of the unit. AC power cord connection is made using power cords with IEC 60320 C-19 connector plugs. The AC power plugs are labeled Input 1, Input 2, and Input 3, which correspond to the power supply modules numbered from left to right. Refer to Figure 12.

To connect AC power:

1. Turn the AC branch circuit breakers to the "OFF" position.
2. Ensure that the AC input switches are in the "OFF" position.

Plug the AC input power cord(s) into the AC socket(s) that correspond to the power supply module slot location(s). For example, the C20 coupler labeled "Input1" corresponds to the power supply module in the furthest left power supply module slot, when viewing the PoE Power Rack from the front.

Figure 12 DC and AC Connections



Initial Start-up

Verify that all AC branch circuit breakers and PoE Power Rack AC power switches are in the "OFF" position.

Powering on the Device

1. Ensure that all power supply modules are seated and locked into position in the PoE Power Rack.
2. Turn the AC branch circuit breakers to the "ON" position.
3. Turn the PoE Power Rack AC power switches to the "ON" position (corresponding to the power supply modules installed).
4. Verify that the "AC OK", "DC OK", and green LEDs are on.
5. Verify the fan is operating on each power supply module.
6. Wait approximately 10-30 seconds to allow the switch system to go through its start-up procedure.
7. Verify that the green LED on the controller panel is on.
8. Use a digital voltmeter to verify that the DC output voltage is approximately -54VDC.
9. For systems with more than one power supply module installed, turn one of the AC power input switches to "OFF" to verify that the red alarm LED lights on the PoE Power Rack controller.
10. For systems with more than one power supply module installed, turn the second AC input switch off to verify that the FAULT LED lights on the controller. Clear the alarms by turning on the AC input switch.

5 ENGINEERING, MAINTENANCE AND TROUBLESHOOTING

Maintenance and Troubleshooting

This section provides field maintenance information and troubleshooting procedures for the PoE Power Rack and power supply modules. Review the safety information in section 3 of this manual before performing maintenance procedures

All procedures described in this section must be performed by qualified maintenance personnel only.

The power supply modules are not field serviceable and must be replaced in the event of a failure.

LED Indication

Use Table 6 to determine if there is a fault with PoE Power Rack.

When visual indicators do not identify a defective part, notify your authorized service representative.

Table 6 Troubleshooting Guide

Controller alarm status	Power supply module display	Possible problems	Possible solution
RUNALM	NONE	■ The AC power input circuit breakers has opened. ■ AC input voltage is too low or power is lost	**1** Verify that AC power input circuit breaker is closed; close circuit breaker if it is open. **2** Verify the AC power is present and in normal range.
RUNALM	AC OKFAULT	■ Power supply module failure ■ Output beyond normal range	Replace the power supply module
RUNALM	AC OKDC OKFAULT	Communication error between the power supply module and the controller	Replace the power supply module
RUNALM	AC OK	■ Power supply module has no output and it is in standby mode ■ Over load ■ Ambient temperature is too high ■ Power supply module failure;	**1** Initialize the power supply module or reset the controller. **2** Check if the load is over the rating. **3** Check the ambient temperature. **4** Replace the power supply module

Table 6 Troubleshooting Guide

Controller alarm status	Power supply module display	Possible problems	Possible solution
ALM or None	--	Controller failure	Replace the controller